Industry Canada Industrie Canada

COMMUNICATIONS

RESEARCH CENTRE

HIGHLIGHTS

1997-1998

Canada

CRC

100-07211/

Advanced Satcom

CRC became the program manager and scientific authority for five contracts awarded by the Canadian Space Agency to the following prime contractors, plus many other Canadian firms as sub-contractor:

- Spar Aerospace ($21,232,000);
- Com Dev ($12,214,000);
- CAL Technologies ($2,700,000);
- Telesat Canada ($10,367,000); and
- Nortel ($16,400,000).

In addition to managing the program, CRC received $1.2 M to conduct systems studies. The program is aimed at producing profitable returns on the joint government-industry investments in R&D for the next generation of multi-media satellites. One partner, COM DEV, estimates the combined value of demand for the kinds of products it will be developing under the Advanced Satcom Program could exceed $2.2 billion over the next 10 years.

ESA Award

CRC has been awarded a $175,000 contract by the European Space Agency (ESA) to define a testbed for testing broadband, multimedia satellite applications and technologies. Called BESTLAB (Broadband ESA Satellite Testbed Laboratory), the plan will define a multi-node distributed broadband satellite communication laboratory to test and demonstrate new services as well as advanced space and ground technologies.

The contract complements current work being carried out by CRC's Broadband Applications and Demonstration Laboratory (BADLAB), the Distributed Broadband Wireless Testbed, and its Satellite Communications Testbed.

BADLAB Information Highway initiatives:

CRC continued to support the Virtual Classroom tele-education project with demonstrations with students in Ottawa and Basel, Switzerland. More than a dozen important events took place, including the CANARIE AGM, NICE Global 360, the KaBand Conference in Sorrento, and HDTV telemedicine conference with Japan. In 1998 BADLAB will become a node in CA*net 2 (3). This program is supported technically by the Satellite Communications Applications Program (SCAP).

Defence Communications

CRC continued to carry out research in support of National Defence's R&D Branch in the areas of terrestrial communications, satellite communications and networking technologies:

- an advanced networking technology providing seamless interoperability between satellite, VHF, HF, and wireline circuits was demonstrated in a major international trial, Joint Warrior Interoperability Demonstration (JWID);
- a prototype HF modem incorporating the new NATO standard for high data rate communications was developed;
- analysis, modelling and simulation of the Army's next generation battlefield communications systems provided critical information for performance evaluation;

DRRI

CRC supported Digital Radio Research Incorporated as a member of the executive offering expert advice for implementing digital radio broadcasting (DRB). CRC is the custodian of the Ottawa DRB site.

R&D Activities

- CRC developed an inter-soldier wireless personal communications system that provides integrated three-dimensional, directional sound and graphical display of soldier positions.
- CRC collaborated with INRS of the University of Quebec and IMAX Corporation on Stereoscopic (3D) video for 3D Movie Theatres, resulting in a three-year NSERC strategic grant to examine the human perceptual, coding and compression aspects of 3D television. A post-doctoral fellow is working at CRC on this project.
- Previous joint work with the Tokyo University of Mercantile Marine on the perceptual aspects of 3D video has resulted in a research grant being awarded to CRC's Dr. James Tam by the Hoso Bunka Foundation in Japan. The grant is for research in establishing the basis for stereoscopic television broadcasting.
- Taking advantage of the flexibility and technical capabilities of emerging Radio Broadcast Systems in Canada, a datacasting demonstration system to provide broadband data communication including internet access to mobile users was successfully developed in collaboration with interested broadcasters and data service industries.
- A new version of the CRC-COV was designed. The radio prediction computer program continues to generate revenues for CRC with licensees in Canada and abroad.
- The Communications Security Establishment contracted CRC to produce dielectric resonator antenna arrays in different frequency bands.
- An LMCS project with Unique Systems involved packaging previously developed chips into a transmitter module. Work with Nortel continued in LMCS research.
- CRC was awarded a contract from COMSAT RSI to provide a prototype satellite tracking system for use with their WorldSpace radio broadcast antenna.
- A new testbed for satellite communications modem testing was delivered to INMARSAT and is expected to be useful for Real-Time DSP-based modem development.
- A collaborative research project with Industry Canada's Spectrum Engineering Branch will develop a second-generation Digital Anaiysis System for the Integrated Spectrum Observation Centre.
- CRC is undertaking work for Industry Canada on spectrum research projects ($750,000) in broadcasting, terrestrial, space, propagation and electromagnetic environments.
- Work continued on the application of iterative processing for capacity enhancement of mobile satellite systems under the CSA-funded International Mobile Satellite Communications Program. Hyper-codes are a new class of codes developed at CRC to improve the efficiency and reliability of wireless communication. The codes have been incorporated into an HF modem.
- CRC is collaborating with TRLabs to develop high-speed optoelectronic devices incorporating both multi-quantum wells and quarter wave Bragg reflectors.
- Collaborative research with JDS Fitel is developing new fibre Bragg gratings for dispersion compensation and the development of phase masks.
- CRC is cooperating with Nortel Networks and the National Research Council to develop prototype Wavelength Division Multiplex (WDM) add-drop network access modules for four optical channels at 2.48 GB/s, which can be used as access nodes on a regional optical network.
- CRC is presently developing WDM router technology. High-speed spatial switches and wavelength converters are under development through a Communications and Information Technology Ontario Industrial Fellowship and Queen's University. The technology development is a joint activity between the University of Waterloo, École Polytechnique, McMaster University and CRC and is partially supported through an NSERC grant.
- CRC has been developing low-cost access technologies for the "last-mile" distribution of interactive high band-width services to business and homes using ion exchanged glass components such as 32x32 star couplers and 4 and 8 channel arrayed waveguide demultiplexers. This activity is partially supported by National Defence.
- Ka-band suitcase terminal development continues and demonstrations at Sorrento, Italy and Fort Drum, New York were successful.

Collaborative Agreements

Collaborative agreements with Carleton University on MMIC and LMCS research continued. CRC collaborates with Teleglobe Canada in the analysis of NASA's ACTS earth space propagation studies. Agreements were also signed with Qdesign Corporation for MPEG compression research and with Vistar for satellite communications coding technology. CRC works with the Canadian Institute for Telecommunications Research (CITR) on EHF broadband research and radio propagation testing for LMCS applications in conjunction with Spectrum Engineering's requirements.

Internationally, CRC collaborated with Korea's Electronics Telecommunications Research Institute (ETRI) for LMCS research and with Taiwan's Chunghwa Telecom for advanced television transmission studies.

Contracting In and Revenue Generation

Each year CRC engages in a number of contracts and collaborative agreements to provide research services to a wider variety of clients. There were 101 new contracting-in agreements (contracts and purchase orders), 109 new IP agreements (licences, non-disclosures, MOAs, MOUs), and 17 new patent applications and six patents issued.

The IP portfolio consists of 201 active patents covering 79 inventions. CRC inventors were awarded $89,000 (based on revenue earned in 1996-97) this year, a sum representing 15% of the revenues received for their licences. Based on revenues earned in 1997-98, the sum will more than triple next year.

There were 309 active IP agreements this year, with 26 technologies raising IP revenue*. Of the $1.28 million IP revenue in 1997-98, $1,056,000 was from licence fees and $224,000 was from royalties. Of the total revenue, $672,000 came from six new sub licencees of the joint CRC/United Technologies Corporation (UTC) patents, reflecting the continuing success of the cross-licensing agreements. The joint CRC/UTC patents for fibre grating technologies earned $811,000. Other significant revenue-generating technologies were:

- CRC-COV software $104,000;
- high-speed data rate modem, $93,000; and
- burst demodulator, $85,000;

New agreements accounted for the remainder of IP revenues.

*IP revenue earned in a given fiscal year is received the following year

CRC Innovation Centre

CRC supports Industry Canada's commitment to build an innovative economy through assistance to small and medium-sized enterprises. CRC's Innovation Centre offers special opportunities to start-up companies interested in accessing its technologies, R&D expertise and unique facilities and testbeds. Automatic membership in CATA and OCRI are offered, as well as access to an IRAP representative. The following companies were clients in 1997-98.

- Adaptive Antenna
- Callisto
- Gandec
- InfoMagnetics Technologies
- MeetingSoft
- Skywave Mobile
- Square Peg
- Trican
- WIC Connexus

WIC Connexus brought 18 employees aboard this year when it decided to explore LMCS research on site. With a full house of resident companies, CRC is planning to expand its facilities by the year 2000. Plans were under way to construct a new building at the front of CRC's campus to house Industry Canada's Certification and Engineering Bureau and expanded CRC's Innovation Centre office space.

INFORMATION

Communications Research Centre

P.O. Box 11490, Station H

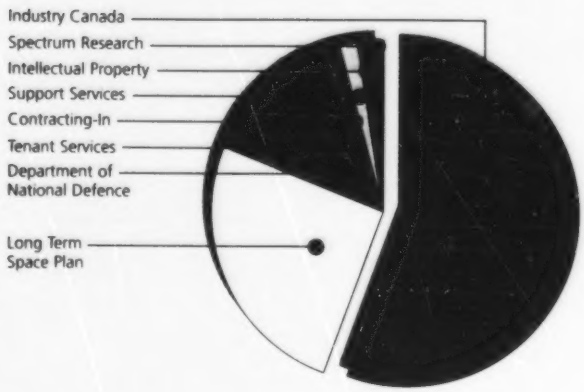
Ottawa, ON CANADA K2H 8S2

General Inquiries: (613) 991-3313

Web Site: http://www.crc.ca

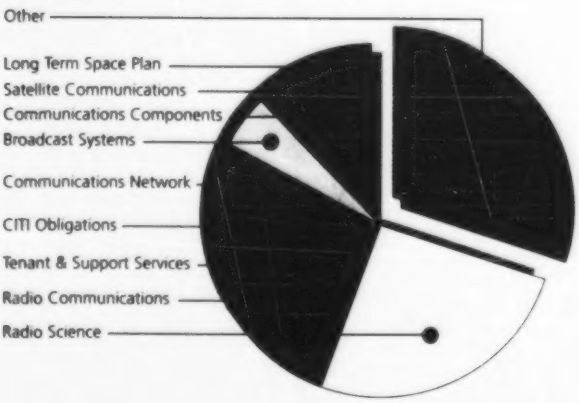
FINANCIAL REPORT

FOR THE FISCAL YEAR 1997-98



Revenues ($000s)

Industry Canada	$34,740.8
Long Term Space Plan	15,940.7
Department of National Defence	5,868.0
Spectrum Research	757.0
Contracting-In	1,081.2
Intellectual Property	792.5
Tenant Services	2,127.3
Support Services	987.9
Total:	*$62,295.4*



Expenses (97-98): ($000s)

Communications Components			$4,575.3
Satellite Communications			5,612.8
Radio Communications			2,313.4
Radio Science			2,053.2
Communications Network			3,209.3
Broadcast Systems			3,475.3
Long Term Space Plan			15,940.7
Tenant & Support Services			3,115.2
CITI Obligations*			3,200.0
Other:	Research Services	5,859.6	
	Site Services	5,539.5	
	Administration	5,364.6	
	Marketing	2,036.5	
			18,800.2
Total:			*$62,295.4*

* *The CITI obligations ended in 1997-98*

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